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STORMWATER MANAGEMENT PLAN FOR PROPOSED DEVELOPMENT AT 74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

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Prepared By: _ _____

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1.0 INTRODUCTION

Richmond and Ross Pty Ltd, Consulting Engineers, has been commissioned by Woolworths Group Limited (the Applicant) to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the SSD- 10468 for the design, construction and operation of a warehouse and distribution center with associated offices at 74 Edinburgh Road, Marrickville (the Site).

The warehouse will be fitted out for the purposes of a speculative warehouse(s) and Customer Fulfillment Centre which will service the inner west and city suburbs.

The requirements for the SEARs issued for SSD 10468 and where these requirements have been addressed are outlined in the table below:

Table 1 Secretary's environmental assessment requirements (SEARs)

Ref.	SEARs	Where addressed
7	Soils and Water assessment including:	
a	An assessment of potential surface and groundwater impacts associated with the development.	Sec 8.0 and Sec 11.0
b	A detailed site water balance, including a description of the development's water demands and associated servicing requirements (including any water licensing requirements).	Not within the scope of this assessment. Refer relevant documentation within the SEARs submission.
c	A description of the surface, stormwater and wastewater management systems, including on site detention, and measures to treat or reuse water	Sec 6.0, Sec 7.0 and Sec 8.0. Wastewater management systems are not within the scope of this assessment. Refer relevant documentation within the SEARs submission.
d	An indicative stormwater management plan prepared by a qualified engineer in accordance with relevant Inner West Council guidelines.	Sec 6.0, Sec 7.0 and Sec 8.0 and civil drawings C01 – C09 within the civil engineering design package
e	A description of the measures to minimize water use and promote water sensitive urban design (WSUD).	WSUD has been addressed in Sec 8.0
f	A description of the proposed erosion and sediment controls during construction.	Sec 10.0 and civil drawings C11-C16 within the civil engineering design package

Table 2 Attachment to SEARs

Ref.	Requirement	Where addressed
Sydney Water	The proponent should outline any sustainability initiatives that will minimize/reduce the demand for drinking water, including any alternative water supply and end uses of drinking and non-drinking water that may be proposed, and demonstrate water sensitive urban design (principles are used), and any water conservation measures that are likely to be proposed. This will allow Sydney Water to determine the impact of the proposed development on our existing services and required system capacity to service the development.	Building over/adjacent to assets will be in strict accordance with Sydney Water published guidelines for building over/adjacent to assets. Flooding has been addressed in the Flood Management Plan. Water quality has been addressed in Sec 8.0.
DPIE **Water and soils**	10. The EIS must describe background conditions for any water resource likely to be affected by the development, including: a. Existing surface and groundwater. b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations. c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/ index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters. d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government. e. Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions http://www.environment.nsw.gov.au/research-andpublications/publications-search/risk-based-framework-for-considering-waterwayhealth-outcomes-in-strategic-land-use-planning 11. The EIS must assess the impacts of the development on water quality, including: a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction. b. Identification of proposed monitoring of water quality.	Stormwater discharge rate has been discussed in 7.0 as in accordance with the managing authority (Sydney Water) of the receiving stormwater network. Stormwater Quality has been discussed in Sec 8.0 and is in accordance with Inner West council published requirements. Ground water has been addressed in Sec 11.0

Ref.	Requirement	Where addressed
	c. Consistency with any relevant certified Coastal Management Program (or Coastal Zone Management Plan). 12. The EIS must assess the impact of the development on hydrology, including: a. Water balance including quantity, quality and source. b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas. c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems. d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches). e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water. f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options. g. Identification of proposed monitoring of hydrological attributes.	As above

2.0 DESCRIPTION OF SITE

The Site is legally described as Lot 202 in DP 1133999, Lot 3 in DP 318232 and Lot 3 in DP 180969, commonly known as 74 Edinburgh Road, Marrickville (see Figure 1). The Site has an area of approximately 27,315sqm and has frontages to both Edinburgh Road (north) and Sydney Steel Road (east).

The key elements within and surrounding the Site include:

- The Site is located within the industrial area of Marrickville and currently accommodates several large freestanding industrial buildings and associated car parking and loading areas;
- Vehicular access to the Site is via an existing entry and exit driveway at the Edinburgh Road frontage. Access is also available from Sydney Steel Road;
- The Site contains minimal vegetation which is fragmented by buildings and areas of hardstand surfaces. Vegetation is limited to scattered trees and shrubs within the Site and planted within the nature strip;
- Is located within 1km of Sydenham Railway Station, which is currently being upgraded as part of the Sydney Metro Chatswood to Bankstown metro line; and

- The Site is well positioned in terms of access to arterial and main roads, public transport modes of bus and rail, Sydney Airport and the retail centre of Marrickville.

Figure 1 Aerial view of the Site (Source: SixMaps)

Figure 2 The Site: Location of proposed warehouse and CFC (Source: Nettleton Tribe)

3.0 THE SITE AND THE SURROUNDING CONTEXT

The Site is well positioned in terms of access to arterial and main roads, public transport modes of bus and rail, Sydney Airport and the retail centre of Marrickville. The Site is located on the northern periphery of the Sydenham Precinct which is part of the Sydenham to Bankstown Urban Renewal Corridor, earmarked for significant employment growth.

The Site also forms part of a large industrial precinct bounded by Edinburgh Road to the north, Railway Parade and the railway line to the east, Marrickville Road/the railway line to the south and Meeks Road/Farr Street/Shepherd Street to the west. The Industrial precinct includes:

- Large free stranding industrial buildings;
- Industrial estates including smaller individual warehouse buildings to the south and east;
- Manufacturing, freight and logistics uses and includes storage facilities, car smash repairs, warehousing and factories.

The Marrickville Metro Shopping Centre also lies to north of the Site. Residential uses are well separated from the Site to the south and east. The Site is also physically separated from residential dwellings to the north and north-west by Edinburgh Road.

4.0 PROJECT DESCRIPTION

The proposed works comprise the following:

- Demolition of the existing buildings, associated structures and landscaping;
- Construction of a two storey warehouse comprising a speculative warehouse at level 1 (ground level) and Customer Fulfillment Centre (CFC) at level 2;
- Construction of associated offices across five levels to be used by Woolworths in conjunction with the warehouse and CFC;
- Two storey car park adjacent to Edinburgh Road;
- Two storey hardstand loading and delivery area adjacent Sydney Steel Road;
- Private vehicle access from two points on Edinburgh Road;
- Heavy vehicle / loading vehicle access from four points on Sydney Steel Road; and,
- Tree removal and landscaping works.

Use of the warehouse will be on a 24-hour, 7-day basis, consistent with surrounding operations.

5.0 EXISTING STORMWATER NETWORK

The site currently drains via an underground network of stormwater pit and pipes to council stormwater network on Sydney Steel Rd. There is no indication of an existing On-site detention (OSD) tank.

6.0 PROPOSED STORMWATER NETWORK

It is proposed to construct a new stormwater network to convey stormwater from the site on the following principles:

- A new network of pipes and pits is proposed to convey the runoff from the site to a stormwater treatment train prior to exiting the site at the legal point of discharge.
- The building roof area will drain to 2x 80kL onsite rainwater tanks (RWT). The collected water will be used for toilet flushing within the site with one RWT being used for office toilet flushing and the other for warehouse toilet flushing. Analysis from MUSIC indicates a minimum of 85% of non potable water demand (toilet flushing) of the site is achieved by this arrangement. See stormwater quality management in section 7 for more details.
- A system consisting of ocean guard pit inserts and filter cartridges is proposed to treat the stormwater runoff generated by the development prior to discharge into Sydney Water owned culvert on Sydney Steel Rd. The proposed treatment train achieves the pollutant removal targets as required by Part 2.17 of the DCP and as modelled in MUSIC. See stormwater quality management below.
- Consultation with Sydney Water has revealed an OSD requirement applies to the site. Therefore, underground OSD tanks are proposed to control the peak stormwater discharge rate generated by the development. See stormwater quantity management below.
- Humeceptors are proposed to treat stormwater prior to it leaving the site. This is to achieve two purposes. The first is to capture hydrocarbons from the vehicular trafficked areas. The second purpose it to reduce TSS.

7.0 STORMWATER QUANTITY MANAGEMENT

Consultation with Sydney Water confirmed that, based on a site area of 28,000m^2, a 427m^3 of OSD (on site detention) storage is required for the site with a permissible site discharge (PSD) rate of 985l/s.

Due to level differences across the site, an area of approx.1,510m^2 is to by-pass the treatment train, and the proposed OSD system, and will be discharged directly to the existing public stormwater network with no restrictions. To assure the maximum allowable discharge from the site does not exceed the allowable PDS limits, the proposed discharge from OSD tank will be reduced to accommodate the difference. A combined OSD and flood chamber is proposed for the site. The OSD discharges into the flood storage chamber which then drains directly into the diverted Sydney water owned culvert.

	Site Area Details
Area (m^2)	27,315
Overall Site OSD volume required (m^3)	427
Area Bypassing OSD (m^2)	1,510
Adjusted OSD volume required (m^3)	452
OSD volume provided	460.4
Overall PSD applicable (l/s)	985
Calculated PSD from the OSD System (l/s)	885
Calculated PSD from the Bypass Area (l/s)	100
Orifice (OSD) proposed (mm)	614
OSD Flow rate at design head (l/s)	885 (1.223 m design head)

8.0 STORMWATER QUALITY MANAGEMENT

There is no indication of existing stormwater quality management measures. A stormwater treatment train is proposed comprising of the following components to meet the treatment targets required by Inner West Council.

8.1 RAINWATER TANKS

Rainwater tanks are proposed to allow for reuse of collected rainwater from roof areas for toilet flushing. Toilet flushing rates are allowed for at 0.1kL/day per pan. The proposed layout included 50x toilet pans within the office building and it is assumed that the warehouse will have approximately 50toilet pans for the purposes of modeling water reuse in MUSIC.

Table 3 Proposed rainwater tanks

	Size	**Total re use rates**			**% Reuse**
Rainwater tank for office use	80kL	Pans	50x	5kL/day	85.39
Rainwater tank for warehouse use	80kL	Pans	50x	5kL/day	86.76

8.2 GROSS POLLUTANT TRAPS (GPT)/ HUMECEPTOR

A Humeceptor has been proposed for the subject catchments to treat runoff entering prior to entering the filter cartridge chamber. PCSWMM calculator was used to determine the minimum humeceptor size requirement based on a TSS removal rate of 80%: STC40. For the purposes of modelling in PCSWMM, it is assumed that the whole site is impervious and is drains via Humeceptor unit (worst-case scenario condition).

Furthermore. the Humeceptor will also aid in the removal of hydrocarbon from runoff in vehicle trafficked areas. The actual removal efficiency is dependent upon hydrocarbon concentration. The STC40 has an oil storage capacity of 10585l.

8.3 FILTER CARTRIDGES

The StormFilter units is a stormwater treatment system using rechargeable, self-cleaning, media-filled cartridges to absorb and retain required level of pollutants from stormwater runoff including total suspended solids, hydrocarbons, nutrients, soluble heavy metals, and other common pollutants. The filter cartridges treat stormwater through a passive filtration system to removes pollutants. A filter cartridge chambers is proposed within the proposed OSD tank. The southern catchment filter cartridge chamber is 10m x 5.5m and has 13 x 690mm filter cartridges.

8.4 WATER QUALITY OUTCOME – MUSIC MODEL

A MUSIC model was prepared for the proposed treatment train. The MUSIC nodes for the treatment devices were obtained from the relevant manufacturers of the device. See figure below for treatment train as modelled in MUSIC.

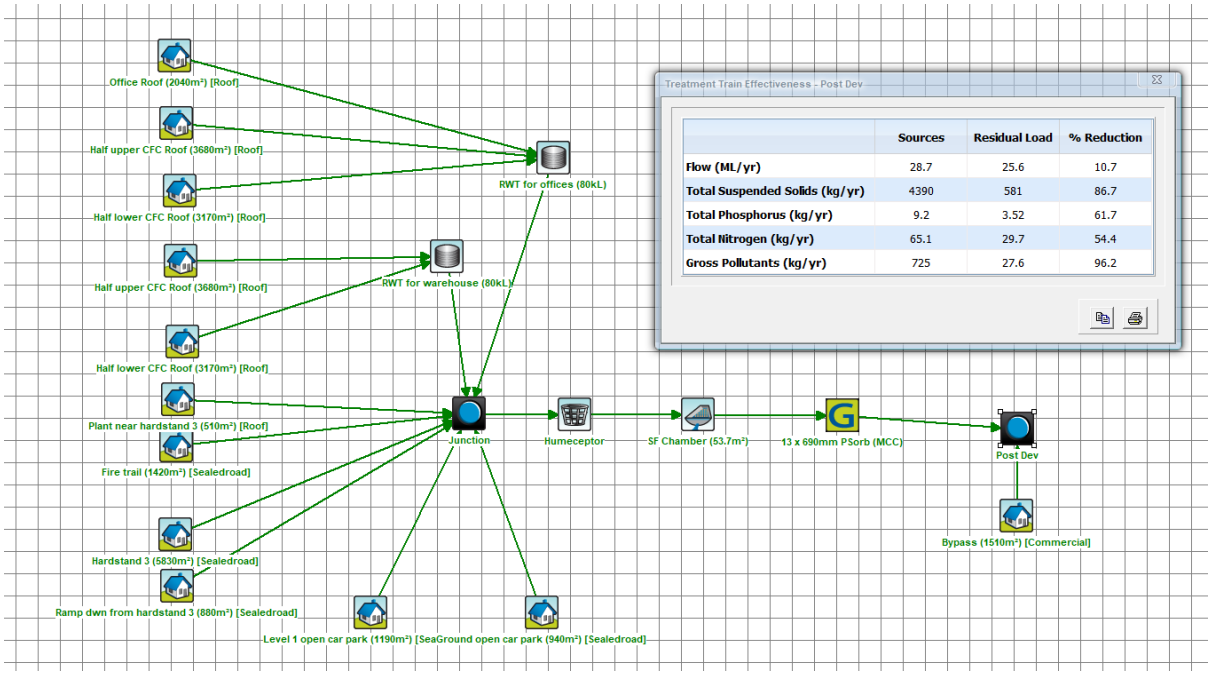


Figure 3 Treatment train and pollution removal as modelled in MUSIC

The overall pollutant removal for the site has been summarised in Table 2 below. An improvement in discharged water quality can be expected by installing the proposed treatment train.

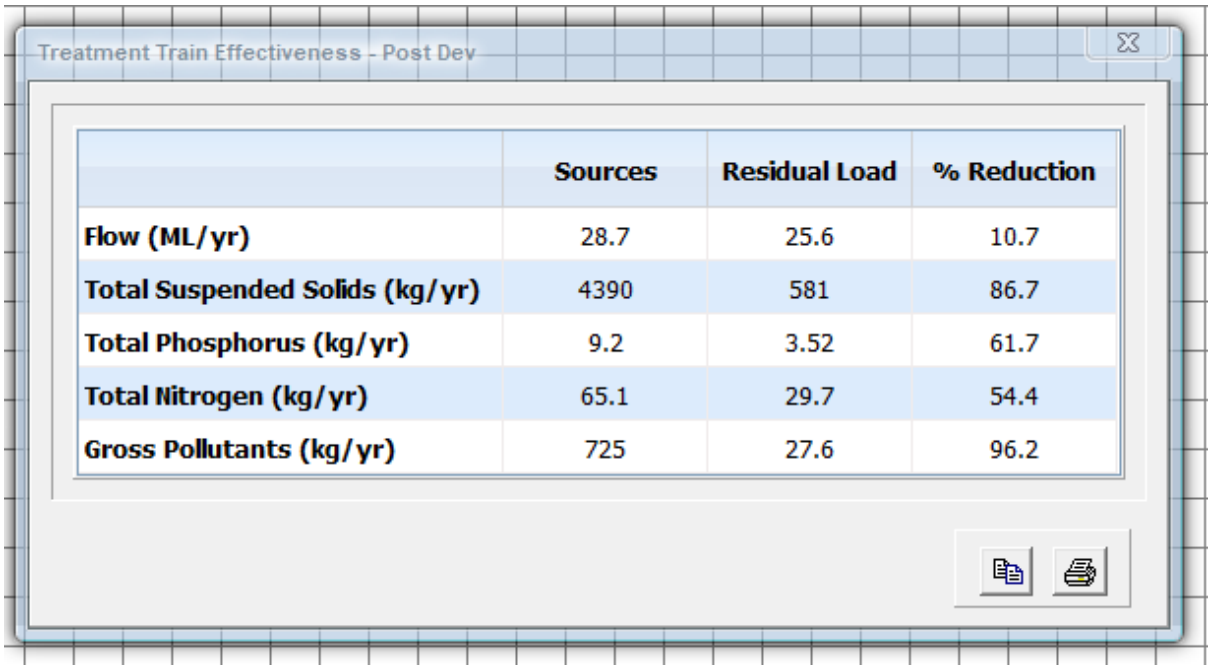


Figure 4 Treatment train effectiveness as modelled in MUSIC

Table 4 Treatment levels for the site

	Sources	Residual Load	% Reduction	Inner West Council Targets (%)
TSS (kg/yr)	4390	581	86.7	85
TP (kg/yr)	9.2	3.52	61.7	60
TN (kg/yr)	65.1	29.7	54.4	45
GP (kg/yr)	725	27.6	96.2	90

9.0 OVERLAND FLOW PATHS

If storms higher than the design storm occur, the site is graded to allow an overland flow path to form which protects the buildings. Overland flows will exit the site via the main entry/exit on the Eastern boundary of the site. Refer to the flood assessment report for details about flood management.

10.0 SEDIMENT AND EROSION CONTROL MEASURES

Sediment and erosion control measures are proposed to limit the amount of sediment washoff from the site during construction. Refer to the civil drawings DWG C11-C16 for specific measures. If the site is expected to remain vacant for extended periods of time after demolition of existing structures, additional erosion control measures should be considered and should be in accordance with NSW Government's policy Managing Urban Stormwater: Soils and Construction (also known as The Blue Book).

11.0 GROUND WATER

Subject to water table depth from Geotech investigations carried out at the detailed design stage, minor ground water drawdown should be anticipated as a result of dewatering of the excavations for the proposed OSD and flood detention chambers during construction.

The existing site and proposed project are both highly impervious and therefore contribute little to groundwater recharge.

The project as a whole involves mostly filling of the site and as such negligible change to local groundwater drawdown is expected with the long term development of the site.

12.0 CONCLUSION

A system has been proposed for the control of stormwater on the subject site, which considers the requirements for water pollution control, stormwater reuse and quantity control.

The proposed system will result in adequate environment protection and reduction in water pollutant loads based on modelling. We believe the system satisfies the requirements of Inner West Council.

A reduction in peak stormwater runoff can also be expected and we believe the system satisfies the requirements of Sydney Water

13.0 GLOSSARY

Term	Definition
The Site	74 Edinburgh Road, Marrickville (Lot 202 in DP 1133999, Lot 3 in DP 318232 and Lot 3 in DP 180969)
The Project	Demolition and the construction of a new warehouse and distribution centre with associated offices.
Customer Fulfilment Centre	The purpose built Woolworths occupied warehouse and distribution facility located on Level 2.
Associated Office	When referring to the office component of the development

14.0 ABBREVIATIONS

Abbreviation	Meaning
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
Council	Inner West Council
DCP	Development Control Plan
FFL	Finished Floor Level
GP	Gross Pollutants
MUSIC	Model for Urban Stormwater Improvement Conceptualisation

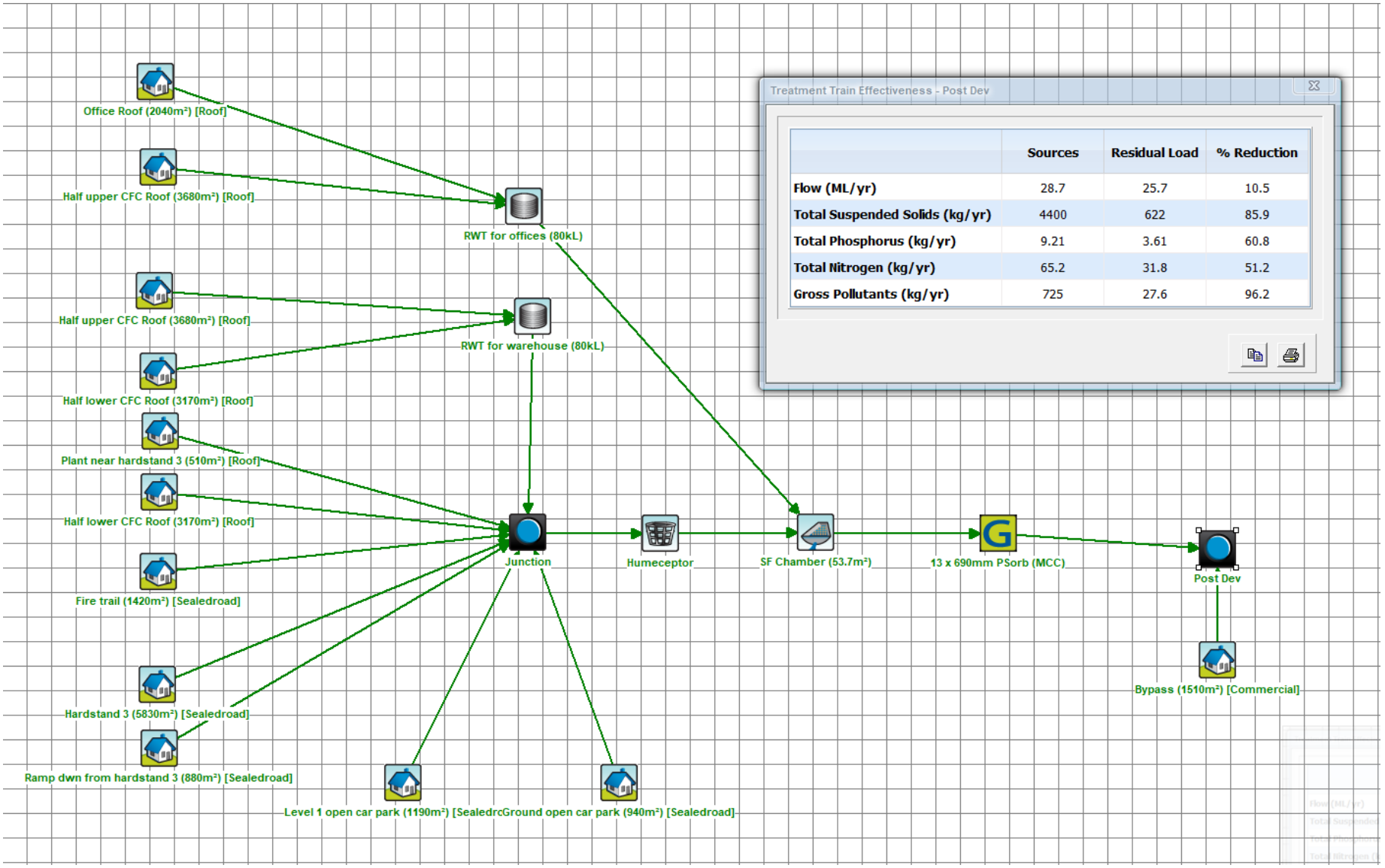
OSD	On Site Detention
PMF	Probable Maximum Flood
PSD	Permissible Site Discharge
RWT	Rain water tank
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids

APPENDIX A – CIVIL DRAWINGS (SCALED DOWN VERSIONS FOR REFERENCE ONLY)

Refer to engineering drawings within the SEARs submission for the full scale drawings.

APPENDIX B – PCSWMM CALCULATOR REPORT

APPENDIX C – MUSIC MODEL RESULT



	Sources	Residual Load	% Reduction
Flow (ML/yr)	28.7	25.7	10.5
Total Suspended Solids (kg/yr)	4400	622	85.9
Total Phosphorus (kg/yr)	9.21	3.61	60.8
Total Nitrogen (kg/yr)	65.2	31.8	51.2
Gross Pollutants (kg/yr)	725	27.6	96.2